Realizing the Potential of Playlists in Math Instruction
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In addition to grading student work, connecting with families, and attending to a myriad of daily logistical duties, teachers are spending a large portion of their out-of-classroom time each week looking for instructional materials or developing it themselves.

A 2016 K-12 Market Advisors report found that:

- Teachers on average spend 7 hours per week searching for instructional resources and another 5 hours per week creating their own instructional materials.
- 66% of the instructional materials teachers use they create themselves (these materials are not provided by the school).

In an attempt to better meet our nation’s learning needs, teachers are sacrificing valuable time to try to find additional resources that:

- students will find more relevant and engaging
- respond to the diverse learning needs in their classroom
- are flexible enough be customized and integrated with other resources
- have the level of rigor students deserve

A growing treasure chest of digital learning content can potentially reduce the need for teachers to create their own resources. Additionally, teachers are increasingly creating learning playlists from this digital content, as a way to better organize and curate a students’ learning experience.

However, with limited planning time and support in instructional design, teachers can face common issues when trying to use playlists and risk spending time and effort on content that lacks the coherence and rigor students need.

As an organization that believes in the power of playlists, PowerMyLearning has seen how well-designed playlists can give teachers a powerful way to provide students with a more engaging, coherent, and rigorous learning experience. Our goal is to help advance the conversation about rigor and coherence among teachers and school leaders so that more classrooms can fully realize the potential of learning playlists. We know that this new approach can require a rethinking of resources, planning, and even the vision of what learning can look like in the classroom and at home, and we want to help share the expertise that we have gained.

In 2016, PowerMyLearning assembled an Advisory Council of top learning scientists, implementers, and other educational thought leaders to help define a set of best practices that educators could refer to when evaluating, designing, and leveraging digital playlists to meet students learning needs. In addition, we conducted individual and group focus group sessions to gather feedback from teachers and instructional coaches using playlists in their schools. These feedback sessions helped us identify a set of common challenges teachers face when using playlists. This feedback has continued to help us map out a feature and content roadmap for PowerMyLearning Connect rooted in sound research principles and directly supports teachers’ most pressing needs.

Common Challenges

From the Advisory Council and focus groups, we found that the most common challenges teachers face when using digital playlists are:

- Lack of coherence between activities
- Lack of rigorous content for instruction and student work
- Lack of explicit support for metacognition

Below we have outlined some key suggestions to respond to challenges above, as well of some of the platform and content improvements we have developed to support each suggestion.
Challenge 1: Coherence

Suggestion: Move from Big Standards to Coherent Targeted Goals

Instructional materials must be aligned to standards, but standards alignment is not enough. As one Advisory Council member put it, “Students and teachers need to understand the coherence among smaller objectives.” Consider this Common Core State Standards (CCSS) standard:

CCSS.Math.Content.7.G.B.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Few teachers would tackle this standard in one class, and would naturally break the standard down into smaller, more digestible, learning objectives or goals. These learning goals can look like “I can...” statements that are meaningful to students. For example, one learning goal for the standard above could be:

[I can...]Solve real-world and mathematical problems involving area of two-dimensional objects composed of triangles, quadrilaterals, and polygons.

When standards are broken down into smaller objectives that students can digest and understand, students benefit from greater clarity about the focus of the different learning activities and assessments they are engaging in. This clarity can help students become more responsible for their learning and more reflective of their own work.

Without this sort of decomposition of broad standards, teachers can pick and choose materials that align to parts of standards without necessarily fully covering the standard. This can lead to a lack of coherence for students. Additionally, when a playlist is created at the standard level without making it explicit to the student which aspects of the standard the different activities

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and assessments are addressing, the learning experience can feel overwhelming and incoherent. This can be highly unmotivating and frustrating for students and can ultimately impair the students’ ability to master the concepts that are being addressed.

A coherent mathematics lesson is goal-oriented and clear in how different activities are connected to meet that goal. Playlists can be much more effective when standards are broken down into more granular learning goals and those goals are clear to students. To make this as explicit as possible for students, we have added slides articulating the learning goal of the playlist at the beginning of each playlist and before the end-of-playlist self-check assessment. This helps students understand the primary learning focus of each of the activities/assessments they will engage in and gives them language on what they are working to master they can refer back to as they complete the playlist. We have also added short student-friendly descriptions of each activity in the playlists, so students can quickly understand the context for the activity they are engaging in and how it relates to the learning goal of the playlist.

**Suggestion: Provide Supports to Ensure Balance Between Choice and Coherence**

One of the biggest advantages of using playlists is the ability to provide a sense of sequence while also giving students choice over when and what they do to reach a learning objective. Allowing students to have some degree of choice throughout their learning experience provides many benefits however, it is important to provide the right supports and strike the right balance so you do not overwhelm students. This is particularly important when combining activities from different sources and publishers.

When activities lack any transitions, they can seem like a series of disconnected moments. In a classroom, most teachers provide segues between activities so students understand what’s coming up next and how it relates to what they have done. This sort of narrative transition can help with digital, asynchronous content as well.

PowerMyLearning Connect’s playlist structure and alignment to targeted learning goals help with this balance, and to further support students, we have added an “activity instructions” popup modal to provide students with additional instructions and/or transitional text for many activities. The instructions help students see how activities fit together, and allow us to use open-ended activities such as virtual manipulatives that require specific instructions to be useful for a particular learning goal.

**Challenge 2: Rigor**

**Suggestion: Leverage Manipulatives to Support Conceptual Understanding**

Strong standards address the rigor imperative by defining mathematical rigor as the right balance between conceptual, procedural, and problem-solving. A common concern among educators is that many of the engaging digital learning activities openly available online focus on procedural fluency and problem solving but leave a gap for developing conceptual understanding.

While it is true that many online resources focus on procedural instruction and problem solving, there are also a number of strong virtual manipulative tools that can drive conceptual understanding. Educators often hesitate to use virtual manipulatives effectively in playlists because they are unable to provide students with enough support to use them in the right way. In order to help teachers better leverage virtual manipulatives, we added the ability to provide activity-specific instructions to our playlist structure which can guide students on how to use a generic manipulative for a specific task.
The activity below is an interactive 100 square, published by David Hellam. This manipulative can help students see patterns, but only if they are given proper guidance about how to use the tool.

http://www.hellam.net/maths2000/100square.html

With instructions, the student can gain conceptual understanding.
Suggestion: Incorporate Tech-Enhanced Questions to Improve Rigor of Assessments

When teachers look at a technology-enhanced questions from a next-generation state assessment, they often worry that their students will struggle to demonstrate their understanding with question structures or interactions that may feel foreign to them. This may cause some teachers to shy away from bringing technology-enhanced questions into classroom instruction. However, helping students engage and build comfort with these technology-enhanced questions can be a key tool for deepening students' conceptual understandings and providing a more authentic, and often more engaging, form of measurement for students.

Both of the examples that follow assess the same CCSS standard (4.NF.A.2).

**Item A:**

Which fraction is greater than \(\frac{3}{5}\)?

- A. \(\frac{1}{2}\)
- B. \(\frac{1}{4}\)
- C. \(\frac{2}{3}\)
- D. \(\frac{2}{6}\)

**Item B:**

Students in Ms. Jackson's running club are each working to complete a goal of running 100 miles by the end of the school year. This chart shows the fraction of the running goal each of the four students completed.

<table>
<thead>
<tr>
<th>Student</th>
<th>Fraction of Goal Hit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hussain</td>
<td>(\frac{2}{5})</td>
</tr>
<tr>
<td>Brenna</td>
<td>(\frac{1}{2})</td>
</tr>
<tr>
<td>Mara</td>
<td>(\frac{1}{3})</td>
</tr>
<tr>
<td>Greg</td>
<td>(\frac{1}{6})</td>
</tr>
</tbody>
</table>

Arrange the fractions in order from least to greatest.

The chance of getting Item A correct by guessing is 25%, while the chance of correctly guessing Item B is about 4%. More importantly, the cognitive and task complexity of the second item are higher than the first item. In Item A, students are comparing 4 different fractions to the prompt fraction. However, Item B requires students to further demonstrate their understanding of sequence by placing all of the fractions in order from least to greatest. Each fraction needs to be compared to the other three fractions, and students will likely have to solve the problem iteratively. For instance, a student could place \(\frac{2}{3}\) in the first spot and \(\frac{3}{4}\) in the second because they know how they relate to each other, but once they see \(\frac{5}{12}\), the first two need to be moved to make room for a new least value. Though the answer has only one correct ordering, a student can use more than one strategy that could be used to solve the problem.
PowerMyLearning recently partnered with CoreSpring to incorporate thousands of tech-enhanced assessment questions into our question library. Additionally, each of our math playlists now include a self-check formative assessment that will help better assess the learning goal, allow students to interact with concepts in new and deeper ways, and put actionable performance data in the hands of the student right away so each student can make informed decisions about their pathway to progress.

Challenge 3: Metacognition

Suggestion: Give Students Prompts to Help Them Reflect on What Is Working for Them

In order for students to be able to fully experience the benefits of playlists, they need support in developing the metacognition that can help them navigate this new type of learning experience in a way that best fits their unique learning needs.

As students continue to interact with new forms of instructional activities and supports, their learning is further supported if they can reflect on which tools and strategies are most effective for them. Metacognitive prompts can often be seen as a nice-to-have but not are not always valued as an integral part of a students’ online learning process; however, one of the key benefits of using a playlist is to give students a more active role in their own learning process and to empower them to do that, they are going to need some additional supports.

PowerMyLearning built playlists to allow teachers to easily add their own prompts. Teachers have the ability to add a prompt as an overarching question that students can answer as they go through the playlist or as reflection checks that they complete after different steps within the playlists. Our advisors suggest teachers can incorporate metacognitive prompts into the playlists they assign by including open-ended questions in the playlist that help students reflect on their learning experience. Prompts can be as simple as:

- Which activities were most helpful in helping you meet the learning goal of this playlist?
- Which activities did you most enjoy?
- Which assessment questions did you struggle the most with? Which did you find to be particularly easy?
- How would you rate your overall enjoyment of this playlist?
- Did you meet the learning goal of this playlist? How do you know?
Conclusion

Teachers spend a great deal of time lesson planning and creating their own resources for students. As teachers continue to increase the proportion of lesson planning they do using playlists and resources from the digital space, they benefit from guidance on how to overcome common challenges to creating strong playlist learning experiences for students. The first common challenge is a lack of coherence. Educators must effectively move from big standards to coherent targeted goals and provide support to ensure a balance between choice and coherence. The second common challenge is a lack of rigorous content for instruction and student work, which teachers can overcome by better leveraging manipulatives to support conceptual understanding and incorporating tech-enhanced questions to improve the rigor of assessments. The last common challenge is a lack of explicit support for metacognition, which teachers can overcome by giving prompts to students to help them reflect on what is working for them.

At PowerMyLearning our goal is to help teachers be more effective in their efforts. Over the past year, we have continued to refine all of our math playlists in grades 3-8 to reflect the best practices outlined in this paper. We are excited to give teachers an educationally sound starting place that they can trust with the flexibility to continue to customize and tweak to one’s classroom context. Each certified math playlist that we offer has been built and vetted by a team of educators and instructional design experts.

With support from resources and tools like those available on PowerMyLearning Connect, teachers can provide students with a deeper, more engaging, and more individualized learning experience.

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